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P. DeLoatch
02/12/04

Patent
Attorney's Docket No. 040070-422

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

| | | |
|-------------------------------|---|-------------------------|
| In re Patent Application of |) | |
| Christer OSTERG |) | Group Art Unit: 2667 |
| Application No.: 09/387,788 |) | Examiner: Andrew Waxman |
| Filed: September 1, 1999 |) | Confirmation No.: 3017 |
| For: METHOD AND APPARATUS FOR |) | |
| DOPPLER FREQUENCY |) | |
| ESTIMATION |) | |

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FEB 11 2004

Technology Center 2600

REQUEST FOR RECONSIDERATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed November 10, 2003, wherein claims 1 and 3-23 are currently pending, Applicant respectfully requests favorable reconsideration in view of the remarks presented herein below.

In paragraph 1, the Office Action rejects claims 1, 3-17, 22 and 23 under 35 U.S.C. §102(b) as allegedly being unpatentable over International Publication No. WO 94/18752 ("Love"). Applicant respectfully traverses this rejection.

In mobile communication systems, signals transmitted between base stations and mobile stations typically suffer from echo distortion or time dispersion (multipath delay). Obstructions, for example, large buildings or nearby mountain ranges, cause a signal to proceed to the receiver along not one, but many paths. The receiver receives a composite signal of multiple versions of the transmitted signal that have propagated along different paths (referred to as "rays"). In order to optimally detect

the transmitted signal, a device known as a searcher finds the different rays, and another device known as a RAKE receiver "rakes" them together. However, if the receiver is not stationary, for example the receiver is a mobile hand-held unit, the rays found by the searcher may no longer be the best rays due to the movement of the receiver. Searching for new rays is computationally complex, time consuming and decreases the battery life of the receiver. (Therefore there is a need for a method to determine when searching for new rays is necessary. The need to search for new paths and the time delay of the new paths is largely dependent on the relative velocity of the receiver. Therefore, if the receiver can determine the Doppler frequency of the mobile, the receiver can determine whether the mobile has moved and whether searching for new paths is necessary)

Accordingly, the present invention provides an apparatus for estimating the Doppler frequency of a receiver. More particularly, the apparatus comprises a channel estimate generator and a Doppler frequency estimator, wherein the Doppler frequency estimator is configured to use two or more channel estimates to generate a Doppler frequency estimate.

Love discloses a method and apparatus for adaptive maximum likelihood sequence estimation using a variable convergence step size. According to Love, the step size is updated as a function of the rate of change of the estimated channel impulse response. The channel impulse response slope is calculated by dividing the difference between a current estimated channel impulse response and the previous estimated channel impulse response. The slope is exponentially smoothed within a one-pole infinite impulse response filter and then compared with a threshold. The step size is then altered based on the comparison.

It is well known that in order to support a rejection under 35 U.S.C. §102, the cited reference must teach each and every claimed element. In the present case, claims 1, 3-17, 22 and 23 are not anticipated by Love for at least the reason that Love fails to disclose each and every claimed element as discussed below.

Independent claim 1 defines an apparatus for receiving a signal, that includes, *inter alia*, a channel estimate generator and a Doppler frequency estimator. Furthermore, the Doppler frequency estimator comprises a normalizer configured to normalize at least two channel estimates and *to generate a Doppler frequency* based on the channel estimates. Likewise, independent claim 16 defines an apparatus for receiving a spread spectrum signal, that includes, *inter alia*, a channel estimate generator and a Doppler frequency estimator as recited in claim 1.

In rejecting claims 1 and 16, the Office Action asserts that Love discloses apparatus comprising a Doppler frequency estimator as claimed inasmuch as Love discloses calculating a rate of change of a channel impulse response from a current estimated impulse response and a previous estimated impulse response. To support this rejection, the Office Action points to Fig 3, page 3, lines 13-21 and page 8, lines 11-21 of Love. This assertion is unfounded for the following reasons.

Although Love discloses calculating a channel impulse response slope which has been determined to provide an indication of Doppler spread within a received signal, nowhere in Love is there any disclosure of using the calculated slope to determine a Doppler frequency estimate as recited in independent claims 1 and 16. The mere disclosure of calculating a slope is not equivalent to calculating a Doppler frequency estimate. Although, the slope calculation of Love may, *arguendo*, be used to calculate a Doppler frequency estimate, the slope in and of itself is not

sufficient to anticipate the actual calculation. In other words, just because Love discloses calculating the slope does not mean that Love also uses the slope to generate a Doppler frequency estimate as claimed. Furthermore, nowhere in Love is there any disclosure of [using the calculated slope to generate a velocity estimate as recited in claims 9-13.]

Claims 3-15, 17, 22 and 23 variously depend from independent claims 1 and 16. Therefore, claims 3-15, 17, 22 and 23 are patentably distinguishable over Love for at least those reasons presented above with respect to claims 1 and 16. Accordingly, Applicant respectfully request reconsideration and withdrawal of the rejection of claims 1, 3-17, 22 and 23 in view of Love.

This application is in condition for allowance. Notice of same is earnestly solicited. Should the Examiner have any questions regarding this application, he is invited to call the undersigned at the telephone number provided below.

Respectfully submitted,

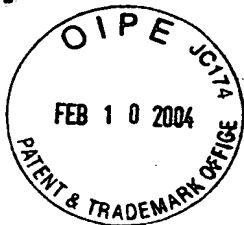
BURNS, DOANE, SWECKER & MATHIS, L.L.P.

Date: February 10, 2004

By: Penny L. Caudle
Penny L. Caudle
Registration No. 46,607

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

2667



Patent
Attorney Docket No. 040070-422

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In re Patent Application of

Christer OSTERG

Application No.: 09/387,788

Filing Date: September 1, 1999

Title: METHOD AND APPARATUS FOR DOPPLER FREQUENCY ESTIMATION

Group Art Unit: 2667

Examiner: Andrew Waxman

Confirmation No.: 3017

AMENDMENT/REPLY TRANSMITTAL LETTER

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed is a reply for the above-identified patent application.

☐ A Petition for Extension of Time is also enclosed.

☐ Terminal Disclaimer(s) and the ☐ \$55.00 (2814) ☐ \$110.00 (1814) fee per Disclaimer due under 37 C.F.R. § 1.20(d) are also enclosed.

☐ Also enclosed is/are _____

☐ Small entity status is hereby claimed.

☐ Applicant(s) requests continued examination under 37 C.F.R. § 1.114 and enclose the ☐ \$385.00 (2801) ☐ \$770.00 (1801) fee due under 37 C.F.R. § 1.17(e).

☐ Applicant(s) requests that any previously unentered after final amendments not be entered. Continued examination is requested based on the enclosed documents identified above.

☐ Applicant(s) previously submitted _____

_____ on _____,
for which continued examination is requested.

☐ Applicant(s) requests suspension of action by the Office until at least _____, which does not exceed three months from the filing of this RCE, in accordance with 37 C.F.R. § 1.103(c). The required fee under 37 C.F.R. § 1.17(i) is enclosed.

☐ A Request for Entry and Consideration of Submission under 37 C.F.R. § 1.129(a) (1809/2809) is also enclosed.

- ☒ No additional claim fee is required.
- ☐ An additional claim fee is required, and is calculated as shown below.

| AMENDED CLAIMS | | | | | |
|--|---------------|---|--------------|--------------------|----------------|
| | No. of Claims | Highest No. of Claims Previously Paid For | Extra Claims | Rate | Additional Fee |
| Total Claims | | MINUS = | 0 | x \$18.00 (1202) = | \$ 0.00 |
| Independent Claims | | MINUS = | 0 | x \$86.00 (1201) = | \$ 0.00 |
| If Amendment adds multiple dependent claims, add \$290.00 (1203) | | | | | |
| Total Claim Amendment Fee | | | | | \$ 0.00 |
| <input type="checkbox"/> Small Entity Status claimed - subtract 50% of Total Claim Amendment Fee | | | | | \$ 0.00 |
| TOTAL ADDITIONAL CLAIM FEE DUE FOR THIS AMENDMENT | | | | | \$ 0.00 |

- ☐ A check in the amount of _____ is enclosed for the fee due.
- ☐ Charge _____ to Deposit Account No. 02-4800.

The Director is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17, 1.20(d) and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800. This paper is submitted in duplicate.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Date: February 10, 2004

By Penny L. Caudle
Penny L. Caudle
Registration No. 46,607